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(71) Applicant: E-PARCEL, LLC [US/US]; Suite 300, 29 Crafts Street, Netwon, MA 02158 (US).

(72) Inventors: KOBATA, Hiroshi; 1111 Beacon Street #12, Brookline, MA 02146 (US). GAGNE, Robert; 1575 Tremont Street #906, Boston, MA 02120 (US).

(74) Agents: HAYDEN, John, F. et al.; Fish & Richardson PC, 601 Thirteen Street, N.W., Washington, DC 20005 (US).

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(57) Abstract

An electronic parcel delivery system for delivering digital information between computer systems over a network is described. The parcel delivery system includes a server system interposed between a sending system and a receiving system. The server system stores digital information received over the network. The digital information can represent a parcel, document, image, executable software, audio file, etc. The sending system transmits a notification to the receiving system. The notification signifies that the sending system is transmitting the digital information to the server system over the network and that the digital information may be accessible by the receiving system. The receiving system can receive the notification directly from the sending system or through a second server system connected to the network. The server system can receive the digital information directly from the sending system or through a second server system connected to the network. The server system can include a web page that the receiving system can access to obtain the stored digital information. The notification can include a resource locator that addresses the Web page on the server system. The Web page can request valid authentication of the receiving system before granting access to the digital information. Delivery of the digital information can be canceled by the sending system after the sending system transmits the digital information to the server system until the receiving system uses the digital information.

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AN ELECTRONIC PARCEL DELIVERY SYSTEM

Field of the Invention

The invention relates generally to the transfer of digital information from a sending system to a receiving system over a network. More specifically, the invention relates to an electronic document delivery system.

Background

The Internet is an international collection of interconnected networks currently providing connectivity among millions of computer systems. One part of the Internet is the World Wide Web (" Web"), a graphics and sound-oriented technology used by computer systems to access a vast variety of digital information, e. g., files, documents, images, and sounds, stored on other computer systems, called "Web sites" (or "Web servers"). A Web site consists of electronic pages or documents called "Web pages."

Computer system users can view digital information at Web sites through a graphical user interface produced by executing client software called a "browser." Examples of commercially available Web browsers include Netscape NavigatorTM and Microsoft Internet ExplorerTM. Web browsers use a variety of standardized methods (i. e., protocols) for addressing and communicating with Web servers. A common protocol for publishing and viewing linked text documents is HyperText Transfer Protocol (HTTP).

To access a Web page at a Web server, a computer system user enters the address of the Web page, called an Uniform Resource Locator (URL), in an address box provided by the Web browser. The UIU can specify the location of a Web server or a file on a Web server. An accessed Web page can include any combination of text,

graphics, audio, and video information (e. g., images, motion pictures, animation, etc.). Often, the accessed Web page has links, called hyperlinks, to documents at other Web pages on the Web. Also, an accessed Web page can invoke execution of an application program.

The development of the Web has enabled computer users to exchange messages and documents both locally and across the world. One popular form of network. communication among Web users is electronic mail (e-mail). Most e-mail communication between users are short messages. Occasionally, an e-mail message may have an attachment, which is a file that is transmitted with the message. This file can be one of many formats, e. g., text, graphics, executable software, etc. E-mail systems, however, typically limit the size of e-mail messages. Attachments beyond this size limit need to be broken into smaller files and reconstructed by the recipient, an inconvenience and task beyond the ken of many e-mail users. Consequently, e-mail may not be a practical medium for transmitting formatted documents because of the typically large size of such documents. Other protocols, such as HTTP and FTP (file-transfer protocol), are able to transfer large files, but interruptions on the network can require repeated transfer attempts to successfully transfer a complete file.

The problem of delivering large documents across the network has led to the development of electronic document delivery systems. One electronic document delivery system is described in United States Patent No. 5,790,790, issued to Smith et al. This delivery system includes a server interposed between sending and receiving computers. The sending system transmits the document to the server, and the server transmits a notification to the receiving system after receiving the full document. This notification includes a direct reference to the forwarded and stored document on the server. The receiving system uses the direct reference to locate and download the

document from the server.

One drawback of this delivery system, however, is that notification occurs after completely transferring the document. As a result, the server must receive the entire document before sending a notification to the intended recipient. However, network failure at one of multiple points in the delivery system can prevent the notification from reaching the receiving system. For one, the server may never receive the entire document and, therefore, never issue a notification to the receiving system. Second, the connection between the server and the receiving system may fail, and the receiving system may not receive the notification issued by the server. In each instance, the receiving system remains unaware that the sending system is attempting to send a document. In the latter instance, the server may have successfully received the document, but the receiving system, without a notification, neither knows to retrieve the document nor where to find it.

Summary

The invention features an electronic parcel delivery system for delivering digital information between computer systems over a network. In one aspect, the system includes a server system connected to the network. The server system stores digital information received over the network. The digital information can represent a parcel, a document, an image, executable software, an audio file, etc. A sending system connected to the network transmits a notification to the receiving system. The notification signifies that the sending system is transmitting the digital information to the server system over the network and that the digital information may be accessible by the receiving system. The receiving system can receive the notification from the

sending system or through a second server system connected to the network. The server system can receive the digital information from the sending system or through a second server system connected to the network.

Also, the-server system can include a page that provides a path by which the receiving system can access the stored digital information. The notification can include a resource locator. In one embodiment, the resource locator of the notification addresses the page on the server system. The page can request valid authentication of the receiving system before granting access to the digital information.

In another aspect, the invention relates to a method for delivering a document from a sending system to a receiving system over a network. Digital information is transmitted from the sending system to a server system. The transmitted digital information is stored at a storage device. A notification is transmitted from the sending system to the receiving system. The notification signifies to the receiving system that the sending system is transmitting the digital information to the server system. A page can be maintained on the server system for accessing parcels managed by the server system. The page can be accessed when accessing the server system to obtain the digital information.

In one embodiment, the sending system concurrently transmits the notification and digital information. A user of the receiving system can be authenticated at the server system before granting access to the digital information by the user. Delivery of the digital information can be canceled by the sending system after the sending system transmits the digital information to the server system. The delivery of the digital information can be canceled until the receiving system uses the digital information.

Brief Description of the Drawings

The invention is pointed out with particularity in the appended claims. The above and further advantages of the invention may be better understood by referring to the following description in conjunction with the accompanying drawings, in which:

Fig. 1 is a diagram of an embodiment of a electronic parcel delivery system according to the principles of the invention, the delivery system including a sending system in communication with a receiving system via a server system;

Fig. 2 is a diagram of an embodiment of the delivery system wherein the sending system transmits a parcel to the server system and a notification to the receiving system in accordance with the principles of the invention;

Fig. 3 is a diagram of an exemplary embodiment of graphical windows presented to the receiving system when accessing the parcel stored on the server system;

Fig. 4 is a diagram of an embodiment of the delivery system wherein the sending system communicates with a Web server, using a Web browser, to send the notification to the receiving system;

Fig. 5 is a diagram of an embodiment of the delivery system wherein the sending system communicates with a Web server, using a web browser, to send the notification to the receiving system and the parcel to the server system;

Fig. 6 is a diagram of an embodiment of the delivery system wherein the sending system communicates with a Web server using client software to send the notification to the receiving system, and the receiving system communicates with the

server system using client software to obtain the parcel;

Fig. 7 is a diagram of an embodiment of the parcel delivery system wherein the sending system delivers the parcel to the receiving system without notifying the receiving system that a parcel has been transmitted; and

Fig. 8 is a diagram of an embodiment of a group of servers acting logically as the server system of the invention.

Description of the Invention

Fig. 1 shows an embodiment of an electronic parcel delivery system 10 for electronically delivering any size and type of file (e. g., binary digital information, text, documents, parcels, multimedia content, video, audio, digital images, software, source code, folders, etc.) over a network 30 according to the principles of the invention. The parcel delivery system 10 includes a sending computer system 14, a receiving computer system 18, and server systems 22 and 26 connected to the network 30. It is to be understood that more than one sending system and receiving system may be connected to the network 30. The network 30 can be, for example, a local-area network (LAN), an Intranet, or a wide area network (WAN) such as the Internet or the World Wide Web.

Each of the sending, receiving, and server systems can be connected to the network 30 through a variety of connections including standard telephone lines, LAN or WAN links (e. g., Tl, T3, 56kb, X. 25), broadband connections (ISDN, Frame Relay, ATM), and wireless connections. The connections can be established using a variety of communication protocols (e. g., HTTP, TCP/IP, IPX, SPX, NetBIOS, Ethernet, RS232, and direct asynchronous connections).

The sending and receiving systems 14, 18 can be any personal computer (e. g., 286,386, 486, Pentium, Pentium II), thin-client device, Macintosh computer, Windows-based terminal, Network Computer, wireless device, information appliance, RISC Power PC, X-device, workstation, mini computer, main frame computer, or other computing device having a graphical user interface. Windows-oriented platforms supported by the sending and receiving systems 14, 18 can include Windows 3. x, Windows 95, Windows 98, Windows NT 3.51, Windows NT 4.0, Windows CE, Windows CE for Windows Based Terminals, Macintosh, Java, and Unix. The sending and receiving systems 14, 18 can include a display screen 34,34', a keyboard 38,38', memory 42,42', a processor 46,46', and a mouse 50,50', respectively.

Each server system 22,26 can be any computing system able to operate as a Web server, communicate according to the HTTP protocol, maintain Web pages, process URLs, and control access to other portions of the network 30 (e. g., workstations, storage systems, printers) or to other networks. The server system 22 can also operate as an e-mail server for exchanging e-mail messages between the sending and receiving systems 14, 18. The server system 26 includes a storage device 54 for storing digital information received from sending systems and destined for subsequent transmission to receiving systems. The storage device 54 can be persistent storage, such as a hard-drive device, or volatile storage, such as dynamic RAM.

The server system 26 can include a group of server computer systems logically acting as a single server system and organized in a scaleable architecture (see Fig. 8).

The server system 26 and the Web server 22 provide the above-described electronic parcel delivery service between sending and receiving systems according to the principles of the invention. Application software installed on the sending system 14 (hereafter client software) and on the server system 26 perform the parcel delivery

service functions. The client software can be installed on receiving system 18, although this is not necessary for the receiving system to receive parcels. The parcel delivery service of the invention provides senders and receivers a variety of services. The services, described below, include data streaming, transmission interruptibility, data encryption and compression, parcel tracking, and parcel canceling.

When launched, the client-side software communicates with the server-side software. The client-side software provides the functionality for sending and receiving parcels. Consequently, the roles of the sending and receiving systems 14, 18 can reverse; senders may become receivers and receivers, senders. The server system 26 operates as a warehouse for received, but undelivered parcels.

The sending and receiving systems 14, 18 can employ at least two techniques or accessing the parcel delivery service: (1)by executing the client software; and (2) by executing a web browser, e. g., Netscape Navigator™ or Microsoft Internet Explorer™. Executing the client software brings the senders and receivers into communication with the server-side software executing on the server system 26; executing the browser brings the senders and receivers to a common-entry web page (e. g., a home page)on the server system 26. Upon accessing the server system 26, the senders and receivers are presented a variety of graphical windows through which the senders and receivers perform the desired parcel sending and receiving operations. These windows are described below in connection with Fig. 3. Although described with respect to Web pages and graphical windows, the principles of the invention are not limited to the context of the World Wide Web, Web pages, and graphical windows. For example, senders and receivers can operate in a non-graphical environment, entering command-line operations according to protocols such as the file transfer protocol to send parcels to and obtain file directories from the server system 26.

To start the parcel delivery service via the client software, the senders and receivers can double-click with a mouse on a graphical, desktop icon representing the client software. An alternative method for sending a parcel is to drag-and-drop a graphical representation of that parcel onto the icon. To start the parcel delivery service via the web browser, users of the sending and receiving systems 14, 18 can double-click on a graphical, desktop icon representing the browser and navigate to the URL associated with the common-entry web page. Alternatively, in accordance with the principles of one embodiment of the invention, the receiver of a parcel notification can click on a hyperlink embedded in the notification. This hyperlink causes the browser to launch and navigate to the common-entry web page.

Fig. 2 shows general operation of the parcel delivery system 10 of the invention. The sending system 14 transmits digital information 58, here referred to as a parcel, to the server system 26 and a notification 62 to the receiving system 18. The transmission of the parcel 58 and notification 62 can occur concurrently. In other embodiments, the sending system 14 can issue the notification 62 before transmitting the parcel 58 or after successfully transmitting the complete parcel 58 to the server system 26. The notification 62 can be automatically or manually generated, whether before, after, or concurrently with transmission of the parcel 58.

The notification 62 signifies to the receiving system 18 that the sending system 14 has transmitted a parcel to the server system 26 intended for the receiving system 18. An e-mail message, for example, can serve as the notification 62. An advantage to using e-mail for notifications is that the sending system 14 can be assured of the on-line availability of the receiving system 18. Typical e-mail services can report to senders that particular receivers have received the e-mail message. Some e-mail services can also inform senders that the particular receiver has read that e-mail

message. These e-mail capabilities, coupled with the capability of canceling delivery, can help reduce costs for distributing parcels by avoiding parcel deliveries to unavailable receivers.

In one embodiment, the notification 62 can be a brief message, such as "You have a parcel." If the user is familiar with the parcel delivery system 10 and knows the location of the common-entry page 66 (or, for example, has recorded the location as a bookmark in the Web browser), this notification indicating that the sending system 14 has sent the parcel, without more, may be sufficient.

In another embodiment, the notification 62 can also include a resource locator (e. g., an URL) addressing the common-entry page 66 on the server system 26. This resource locator can operate as a hyperlink that launches the web browser and navigates to the common-entry page 66 with a click of the mouse. Alternatively, the receiving system 18 can manually launch the browser and enter the URL corresponding to the common entry page 66.

By having the sending system 14 notify the receiving system 18, rather than the server system 26, the receiving system 18 acquires an earlier notification of the imminent delivery of a parcel. Consequently, the receiving system 18 can take advantage of data streaming capabilities of the parcel delivery service provided by the server system 26, described later in the description, by requesting the parcel 58 while the parcel 58 is not yet completely transmitted from the sending system 14 to the server system 26.

The server system 26 can store the parcel 58 in the storage system 54. In response to the notification 62, the receiving system 18 can access the server system 26 (e. g., at the common-entry page 66)and request 70 the parcel 58. This request 70 can be automatically generated by software installed on the receiving system 18 or

deliberately initiated as described above. The server system 26 can then download the parcel 58 to the receiving system 18.

To obtain the parcel 58, the receiving system 18 can access from the server system 26 (e. g., via the common-entry page 66) and then traverse a sequence of graphical windows as shown in Fig. 3. The windows produce a graphical user interface that can lead receiver the access the parcel 58. As noted above, the page 66 can be manually or automatically visited. Downloading the page 66 to the receiving system 18 can cause execution of a Common Gateway Interface (CGI) script. The script can require log-on authentication of the receiving system user and prompt the user for log-on information 72, such as a user-name and a password.

After successful authentication, a second window 78 presents the user with a status of parcels received (" inbox")and sent (" outbox")by that user. By selecting the "inbox," the user can obtain a list of parcels, previously and presently received, and information about those parcels. The information can include the size of each parcel and a status whether the user has opened that parcel. The user can select one of the listed parcels by double clicking on the desired parcel identifier. In Fig. 3, the window 78 indicates that the user has three parcels.

If, for example, the user selects parcel #1, then the next displayed window is a cover sheet 82 that provides information about attributes of the selected parcel, such as the identity of the sending system, the name of the parcel, the time sent, and the parcel size. The cover sheet 82 gives the receiving system user an opportunity to accept or reject delivery of the parcel. The receiving system user can view the attribute information, decide to refuse delivery, and consequently reject the parcel. This feature enables the user to avoid downloading oversized files, unwanted information, suspicious files, or transmissions from unknown or unwanted senders.

The cover sheet 82 can also include a resource locator, here "file," for obtaining the selected parcel. The resource locator can include parameters that indirectly reference the storage location of the digital information representing the selected parcel. One such parameter is an unique identifier associated with the selected parcel. Other parameters can include session information, such as the identification of the user and a session key. The server system 26 maintains a data structure (e. g., a database or a table)that maps parcel identifiers to the storage locations. A CGI script processes the parameters and accesses the data structure to identify the storage location of the selected parcel, obtain the stored parcel, and start streaming the digital information to the receiving system 18.

Data Streaming:

Data streaming involves uploading the parcel 58 to the server system 26 while downloading the parcel 58 to the receiving system 18. This process can reduce by almost half the amount of time for full delivery of the parcel 58. The time reduction occurs because the process of downloading the parcel to the receiving system 18 does not wait until the entire parcel arrives at the server system 26 from the sending system 14; the server system 26 can start transmitting upon receiving the digital information. Data streaming can occur automatically, provided the receiving system 18 is on-line. For embodiments in which the receiving system user can reject the parcel, the receiving system 18 can request the parcel 58 from the server system 26 before the server system 26 completely receives the parcel 58 to take advantage of data streaming.

If the receiver is not on-line when the sending system 14 transmits the parcel 58 to the server system 26, the transmission can continue until the entire parcel 58 is uploaded to the server system 26. The server system 26 then waits until the receiving

system 18 comes on-line and requests the parcel 58 before downloading to the receiving system 18.

In one embodiment, the server system 26 deletes the digital information from the storage system 54 after successfully transmission to the receiving system 18. The receiving system 18 can return acknowledgments to the server system 26 upon receiving the digital information. By this process, the server system 26 can make efficient use of available storage and reduce the amount of storage needed for parcels awaiting delivery to receiving systems.

Interruptibilty:

In the event of an interruption in the transmission of the parcel 58 from the server system 26 to the receiving system 18, the server system 26 can resume transmission of the parcel 58, from the point of interruption after reestablishing the connection. In one embodiment, the receiving system 18 determines that point from the size of the parcel and the time of interruption. When the server system 26 initially sends the parcel 58 to the receiving system 18, the parcel includes a unique identifier that indicates the size of the parcel 58 to the receiving system 18. After the connection is reestablished, the receiving system 18 uses the parcel size and the time of interruption to request from the server system 26 only those portions of the parcel 58 not previously transmitted.

Security:

The delivery system 10 of the invention provides security at various levels. At one level, the server system 26 can authenticate the user identities of the sending and receiving systems 14, 18. This authentication can include uniquely identifying the installations of the client software on the sending and receiving systems 14, 18. At another level, the delivery system 10 authenticates each delivery transaction. At

another level, in preparation for transmission, the client software compresses and encrypts the digital information in real time. At still another level, the receiving system user can reject parcel deliveries rather than download from the server system 26.

Real Time Tracking:

After the sending system 14 initiates transmission of the parcel 58 to the receiving system 18, the sending system 14 can track the real-time progress of the parcel 58 through the network 30. Tracking information can include when the sending system 14 started transmitting the parcel 5 58 to the server system 26, the progress of uploading the parcel 58 to the server system 26 (or intermediate web server as described below), the status of the receiving system 18 (e. g., unregistered, off-line, on-line, etc.), the progress of downloading the parcel 58 to the receiving system, and the status of the received parcel (e. g., parcel being received, parcel moved to another location in memory, parcel delivered, parcel opened, time of opening, etc.). The server system 26 can verify that the receiving system 18 has received the parcel 58 using a signature uniquely identifying the receiving system 18 user and, when the receiving system 18 executes client software to access the server system 26, a unique identifier associated with that client software. The signature and unique identifier can accompany a returned acknowledgment from the receiving system 18 to securely signify that the receiving system 18 has received from the server system 26 the last bit of digital information pertaining to the parcel 58.

The server system 26 can record the progression of the transmission for the parcel 58 in a database, along with the signature and client software identification. The database can provide an audit trail for the sending and receiving systems 14, 18 to view. Accordingly, tracking provides the sending system 14 a mechanism for

confirming receipt and subsequent use of parcel 58, a capability generally lacking in the trans-Internet communications.

Cancel Delivery:

The sending system 14 can cancel delivery of the parcel anytime during the transmission of the parcel to the receiving system 18. The sending system 14 signals the server system 26 to stop the delivery. If the server system 26 has not started transmitting the parcel to the receiving system 18, then the server system 26 can forego forwarding the parcel or delete the parcel from the storage system 54. If the server system 26 has transmitted the parcel to the receiving system 18, then the server system 26 can forward the cancel signal to the receiving system 18. The client software on the receiving system 18 deletes the parcel upon receiving the cancel signal from the server system 26, provided the parcel 58 is incompletely received or is completely received, but still unopened. Conceivably, a completely delivered and opened parcel may be canceled, although permission by the receiving system user may be necessary to do so. Upon request by the sender, the server system 26 can recover any canceled deliveries, provided the digital information is still available (i. e., has not been overwritten).

Fig. 4 shows another exemplary embodiment of the electronic parcel delivery system 10 of the invention, including the sending system 14, the receiving system 18, the server system 26, and a Web server 22. The sending and receiving systems 14, 18 are in communication with the Web server 22 and the server system 26, and the Web server 22 is in communication with the server system 26. Parcel 58 passes directly from the sending system 14 to the server system 26, and the server system 26 stores the parcel 58 in the storage system 54. The sending system 14 sends the notification 62 to the Web server 22, and the Web server 22 provides the notification 62 to the

receiving system 18. The notification 62 operates similarly to the notification 62 described in the embodiment of Fig. 2.

In this embodiment, the sending and receiving systems 14, 18 run the Web browsers 90, 94 to access the common-entry page 66 on the server system 26. The Web server 22 transmits the graphical user interfaces between the sending and receiving systems 14, 18, and the server system 26. Tracking requests and reports between the sending and server systems 14,26 also pass through the Web server 22.

Fig. 5 shows another exemplary embodiment of the parcel delivery system 10 of the invention similar to the embodiment shown in Fig. 4. A difference from the Fig. 4 embodiment is that the sending system 14 transmits the parcel 58 to the Web server 22 instead of directly to the server system 26. The Web server 22 then forwards the parcel 58 to the server system 26.

Fig. 6 shows another exemplary embodiment of the parcel delivery system 10 wherein the sending and receiving systems 14, 18 each execute the client software to access the server-side software executing on the server system 26. Like the embodiment of Fig. 4, the sending system 14 transmits the parcel 58 directly to the server system 26 and the notification 62 to the Web server 22. The Web server 22 notifies the receiving system 18 of the parcel, and the receiving system 18, in response, obtains the parcel 58 from the server system 26. In contrast to the embodiment of Fig. 4, the user interfaces, tracking requests, and tracking reports pass directly between the sending system 14 (or receiving system 18)and the server system 26, rather than through the Web server 22.

In other embodiments, the sending system 14 can execute the Web browser 90, while the receiving system 18 executes the client software; or conversely, the sending system 14 can execute the client software while the receiving system executes the

Web browser 94. Generally, in such embodiments, the client software communicates directly with the server system 26 to exchange information, such as the user interface and the tracking information, and the Web browser communicates indirectly with the server system 26 through the Web server 22.

Fig. 7 shows still another embodiment of the parcel delivery system 10 wherein the sending system 14 delivers the parcel 58 to the server system 26 without any notification mechanism to alert the receiving system 18 that the sending system 14 has sent the parcel 58. The sending system 14 can transmit the parcel 58 to the server system 26 directly or through the Web server 22. When the sending system 14 executes the client software, the user interface and the parcel 58 are communicated directly to the server system 26. When the sending system 14 executes the Web browser 90, the parcel and user interface are communicated through the Web server 22.

When the receiving system 18 goes on-line, an URL is presented to the user in a graphical user interface by which the receiving system user can obtain the parcel. Alternatively, the receiving system 18 can periodically poll the server system 26 to determine if any new parcel deliveries have occurred.

Scaleable Server Architecture

Fig. 8 shows one embodiment of an exemplary group of servers acting logically as the server system 26. The group of servers includes a root server 100, one or more user servers 102, 104, and one or more data servers 106. The root server 100 tracks each user server 102, 104 and data server 106 in the group. The root server 100 can also maintain information about other remote server systems or groups of server systems that can provide the electronic parcel service in conjunction with the server system 26.

The user of the sending system 14 and user of the receiving system 18 are each assigned to a user server when the users first register with the server system 26. The root server 100 selects the user server to which each user is assigned. For example, the root server 100 can assign the sending system user to user server 102 and the receiving system user to user system 104. When the sending system 14 subsequently contacts the server system 26 to initiate delivery of a parcel, the sending system 14 obtains the identity of the assigned user server 102 from the root server 100 (arrow 108). The sending system 14 sends parcel information, including the name of the intended receiver, to the user server 102 (arrow 110).

In response to the communication from the sending system 14, the user server 102 allocates one of the data servers 106 to store that parcel and notifies the sending system 14 of the allocation. The sending system 14 can then transmit the parcel directly to the allocated data server 106 via link 112. The assigned user server 102 provides, via link 114, each other user server 104 in the group (and remote user servers) with the identity of the intended receiver of the parcel.

Upon logging on to the server system 26, the receiving system 18 obtains from the root server 100 the identity of the user server 104 assigned to the receiving system 18 (arrow 116). The receiving system 18 subsequently communicates with the user system 104 to determine that the new parcel is available on the data server 106 (arrow 118). The user system 104 was able to communicate this information to the receiving system 18 because the user system 102 had previously communicated the information to the user system 104. The user server 104 gives the receiver a session key with which the receiving system 18 contacts the data server 106 and retrieves the parcel (arrow 120). The data server 106 captures the transaction information as described above, which can be useful in preparing billing information.

While the invention has been shown and described with reference tospecific preferred embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention as defined by the following claims.

What is claimed is:

1. An apparatus for electronically delivering a document to a receiving system over a network, comprising:

a server system connected to the network and storing digital information received over the network; and

a sending system connected to the network and transmitting a notification to the receiving system, the notification signifying that the sending system is transmitting the digital information over the network to the server system and that the digital information may be accessible by the receiving system at the server system.

2. The apparatus of claim 1 wherein the server system receives the digital information from the sending system.

3. The apparatus of claim 1 wherein the server system is a first server system, and further comprising:

a second server system in communication with the sending system and the first server system, wherein the first server system receives the digital information from the sending system via the second server system.

4. The apparatus of claim 1 further comprising:

a second server system in communication with the sending and receiving systems, and wherein the sending system transmits the notification to the receiving system through the second server system.

5. The apparatus of claim 1 further comprising:

a storage device in communication with the server system; and

wherein the server system stores the digital information at an address location of the storage device, and wherein the server system includes a page providing a path by which the receiving system can access the digital information at that address location.

6. The apparatus of claim 5 wherein the notification includes a resource locator.

7. The apparatus of claim 6 wherein the resource locator addresses the page on the server system.

8. The apparatus of claim 5 wherein the page requests valid authentication information from the receiving system before granting access to the digital information.

9. The apparatus of claim 5 wherein the page provides access to a graphical window describing contents of the digital information.

10. The apparatus of claim 9 wherein the graphical window includes a resource locator indirectly referencing the address location in the storage device where the digital information is stored.

11. The apparatus of claim 10 further comprising:

a data structure mapping identifiers to address locations in the storage device, and wherein the resource locator includes an unique identifier corresponding to the digital information, the resource locator referencing a second page on the server system that accesses the data structure using the unique identifier to determine the address location of the digital information.

12. The system of claim 1 wherein the server system is a group of server systems acting logically as a single server system.

13. An electronic document delivery system, comprising:

a server system;

a sending system; and

a receiving system in communication with the server and the sending systems, and wherein the sending system transmits digital information to the server system and a notification to the receiving system, the notification signifying to the receiving system that the sending system has transmitted the digital information to the server system; and wherein the receiving system, in response to the notification, can access the server system to obtain the digital information.

14. The system of claim 13 further comprising:

a second server system, in communication with the sending and the receiving systems, receiving the notification from the sending system and forwarding the notification to the receiving system.

15. The system of claim 13 wherein the server system is a first server system, and further comprising:

a second serversystem, in communication with the sending and the first server systems, receiving the digital information from the sending system and forwarding the digital information to the first server system.

16. A method for delivering a document from a sending system to a receiving system over a network, comprising the steps of:

transmitting digital information from the sending system to a server system over the network;

storing the transmitted digital information at a storage device; and

transmitting a notification from the sending system to the receiving system signifying to the receiving system that the sending system is transmitting the digital information to the server system and that the digital information may be accessible to the receiving system.

17. The method of claim 16 further comprising the step of transmitting the digital information from the server system to the receiving system in response to a request from the receiving system to access the digital information.

18. The method of claim 16 further comprising the step of confirming that the receiving system has completely received the digital information.

19. The method of claim 18 further comprising the step of executing server-side

software on the server system through which the receiving system can obtain access to the digital information.

20. The method of claim 18 further comprising the step of maintaining a page on the server system through which the receiving system can obtain access to the digital information.

21. The method of claim 20 wherein the notification includes a resource locator for accessing the page on the server system.

22. The method of claim 16 wherein the sending system concurrently transmits the notification and digital information.

23. The method of claim 16 wherein the server system receives the digital information from the sending system.

24. The method of claim 16 further comprising the steps of:

receiving the notification at a second server system on the network; and

transmitting the notification from the second server system to the receiving system.

25. The method of claim 16 wherein the server system is a first server system and further comprising the steps of:

receiving the digital information at a second server system; and

transmitting the digital information from the second server system to the first

server system.

26. The method of claim 16 wherein the server system is a first server system and further comprising the steps of:

receiving the notification and the digital information at a second server system on the network;

transmitting the notification from the second server system to the receiving system. and

transmitting the digital information from the second server system to the first server system.

27. The method of claim 16 further comprising the step of:

authenticating a user of the receiving system at the server system before granting access to the digital information by the user.

28. The method of claim 16 further comprising the step of tracking the digital information in real-time through the network.

29. The method of claim 28 wherein the step of tracking includes notifying the sending system when the receiving system starts using the digital information.

30. The method of claim 16 further comprising the step of canceling delivery of the digital information by the sending system after the sending system transmits the digital information to the server system.

31. The method of claim 16 further comprising the step of canceling delivery of the digital information at any time before the receiving system uses the digital information.

32. The method of claim 16 further comprising the steps of:

transmitting the digital information from the server system to the receiving system;

experiencing an interruption at a point in the transmission of the digital information;

reestablishing a connection between the server system and the receiving system; and

resuming transmission of the digital information starting with previously unsent digital information at the point of interruption.

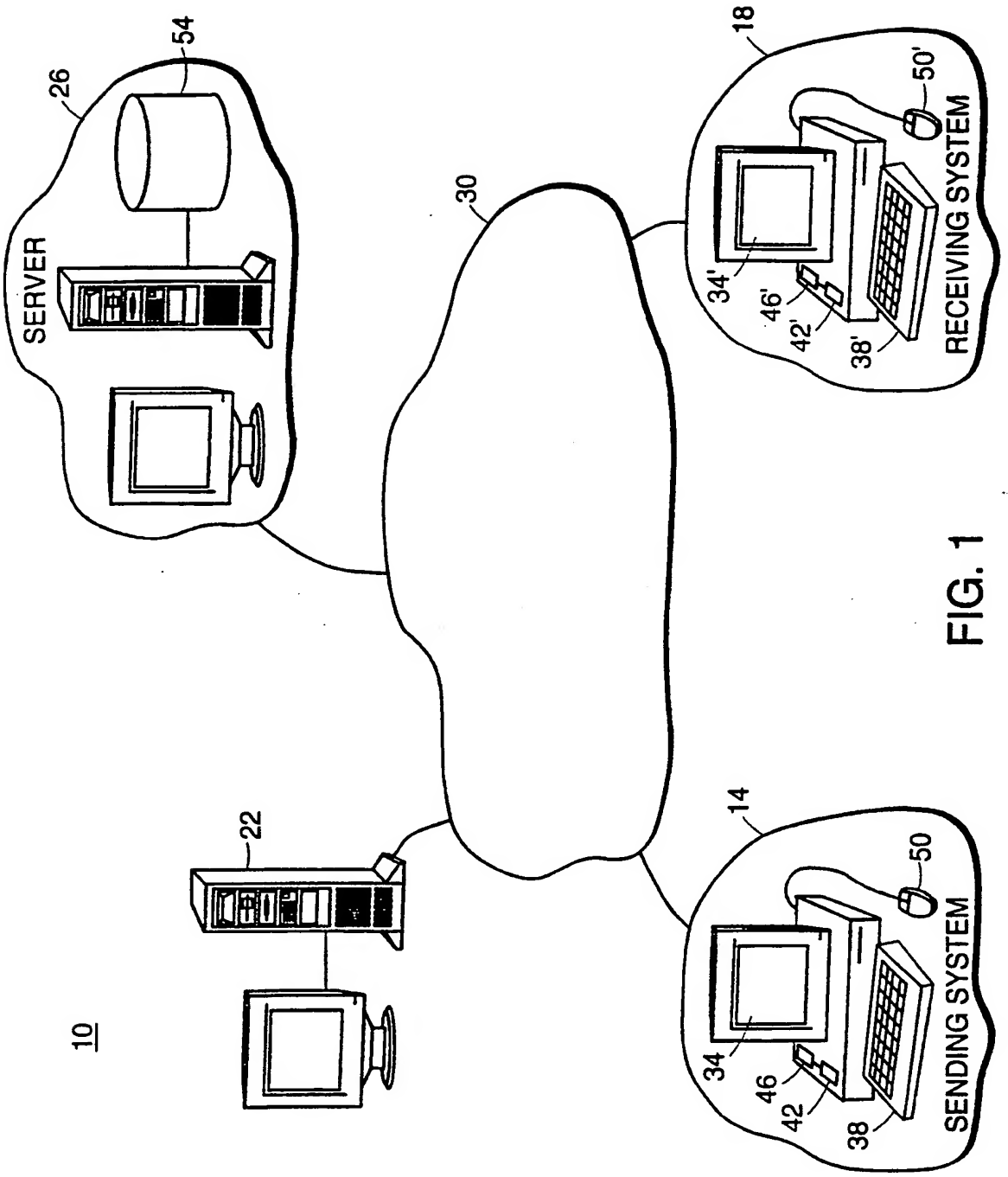
10
SERVER
26
54
22
30
18
50'
RECEIVING SYSTEM
34'
46'
42'
38'
14
50
SENDING SYSTEM
34
46
42
38

FIG. 1

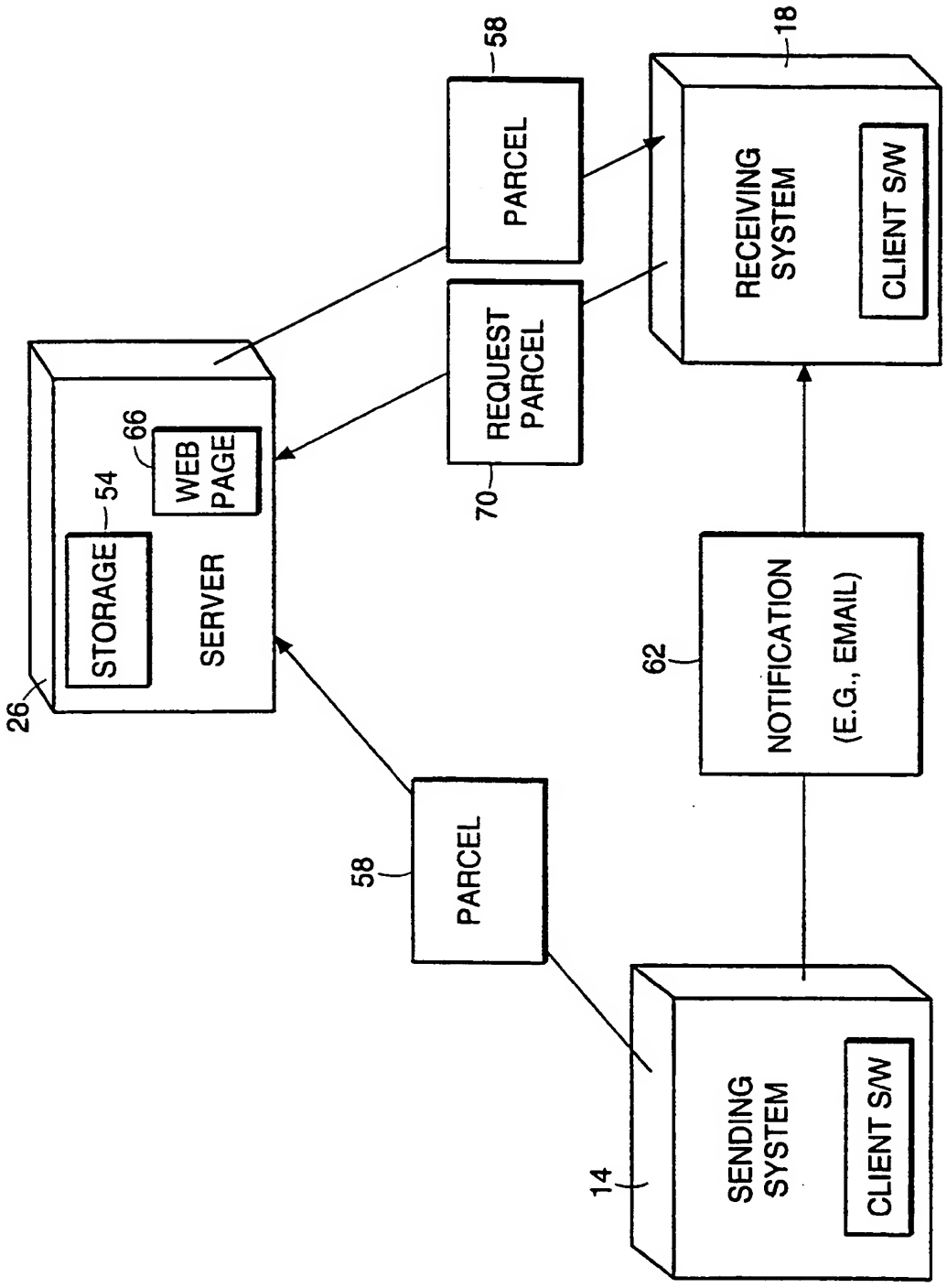
58
PARCEL
18
RECEIVING SYSTEM
CLIENT S/W
REQUEST PARCEL
70
66
WEB PAGE
54
STORAGE
SERVER
26
62
NOTIFICATION (E.G., EMAIL)
58
PARCEL
14
SENDING SYSTEM
CLIENT S/W

FIG. 2

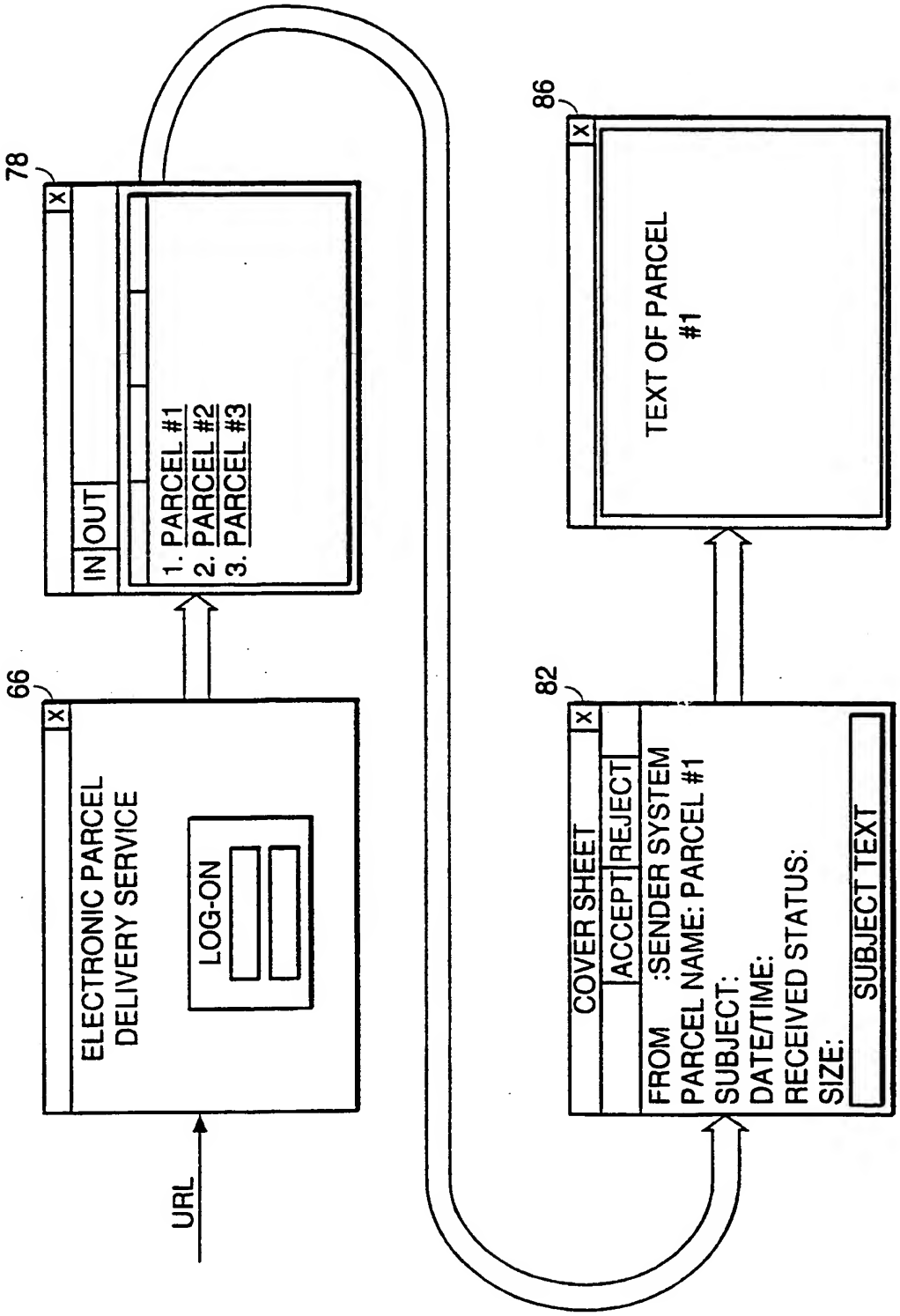
78
IN
OUT
1. PARCEL #1
2. PARCEL #2
3. PARCEL #3
86
TEXT OF PARCEL #1
66
ELECTRONIC PARCEL DELIVERY SERVICE
LOG-ON
URL
82
COVER SHEET
ACCEPT
REJECT
FROM :SENDER SYSTEM
PARCEL NAME: PARCEL #1
SUBJECT:
DATE/TIME:
RECEIVED STATUS:
SIZE:
SUBJECT TEXT

FIG. 3

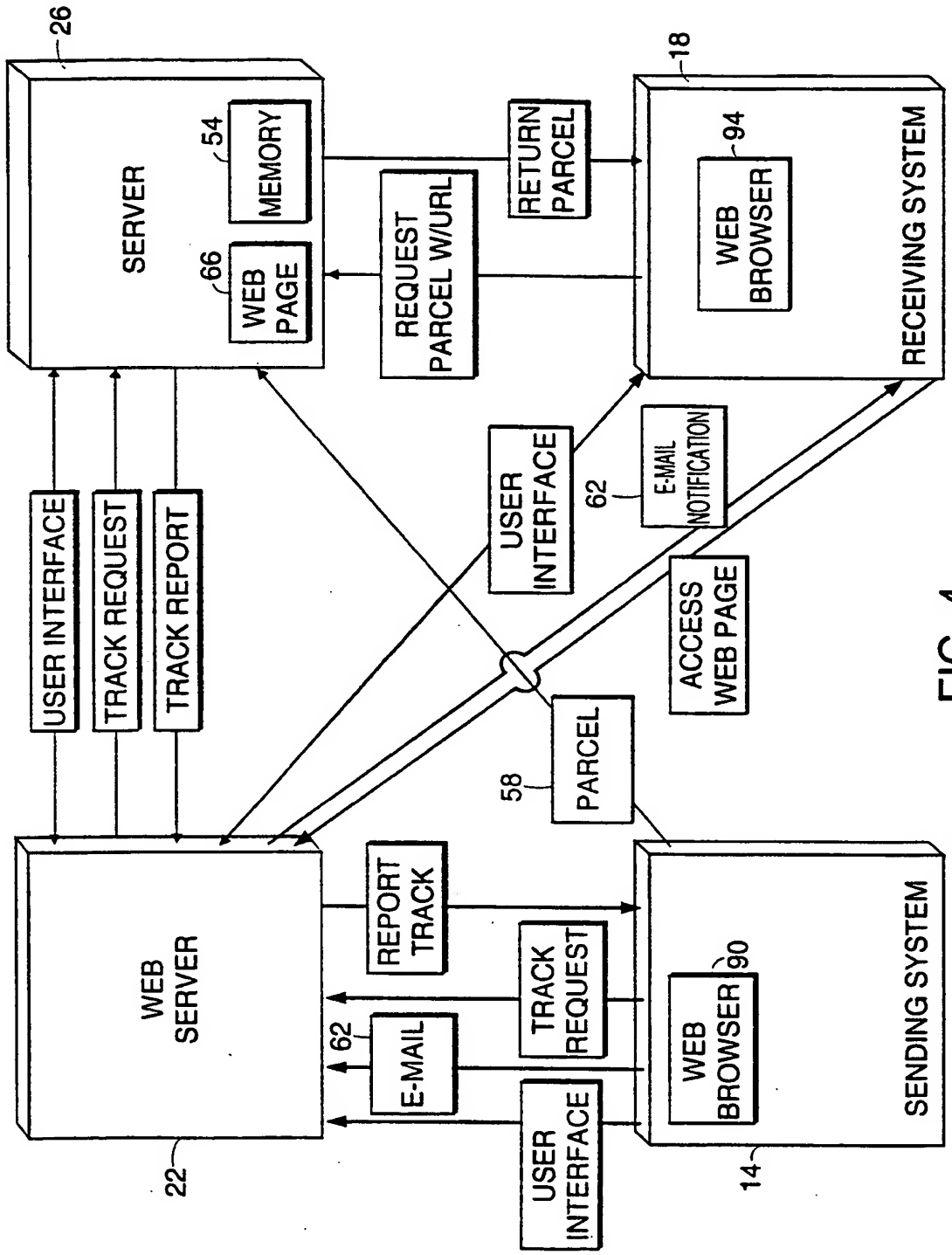
26
SERVER
54
MEMORY
66
WEB PAGE
REQUEST PARCEL W/URL
RETURN PARCEL
18
94
WEB BROWSER
RECEIVING SYSTEM
USER INTERFACE
TRACK REQUEST
TRACK REPORT
USER INTERFACE
62
E-MAIL NOTIFICATION
ACCESS WEB PAGE
58
PARCEL
WEB SERVER
REPORT TRACK
TRACK REQUEST
62
E-MAIL
USER INTERFACE
90
WEB BROWSER
SENDING SYSTEM
22
14

FIG. 4

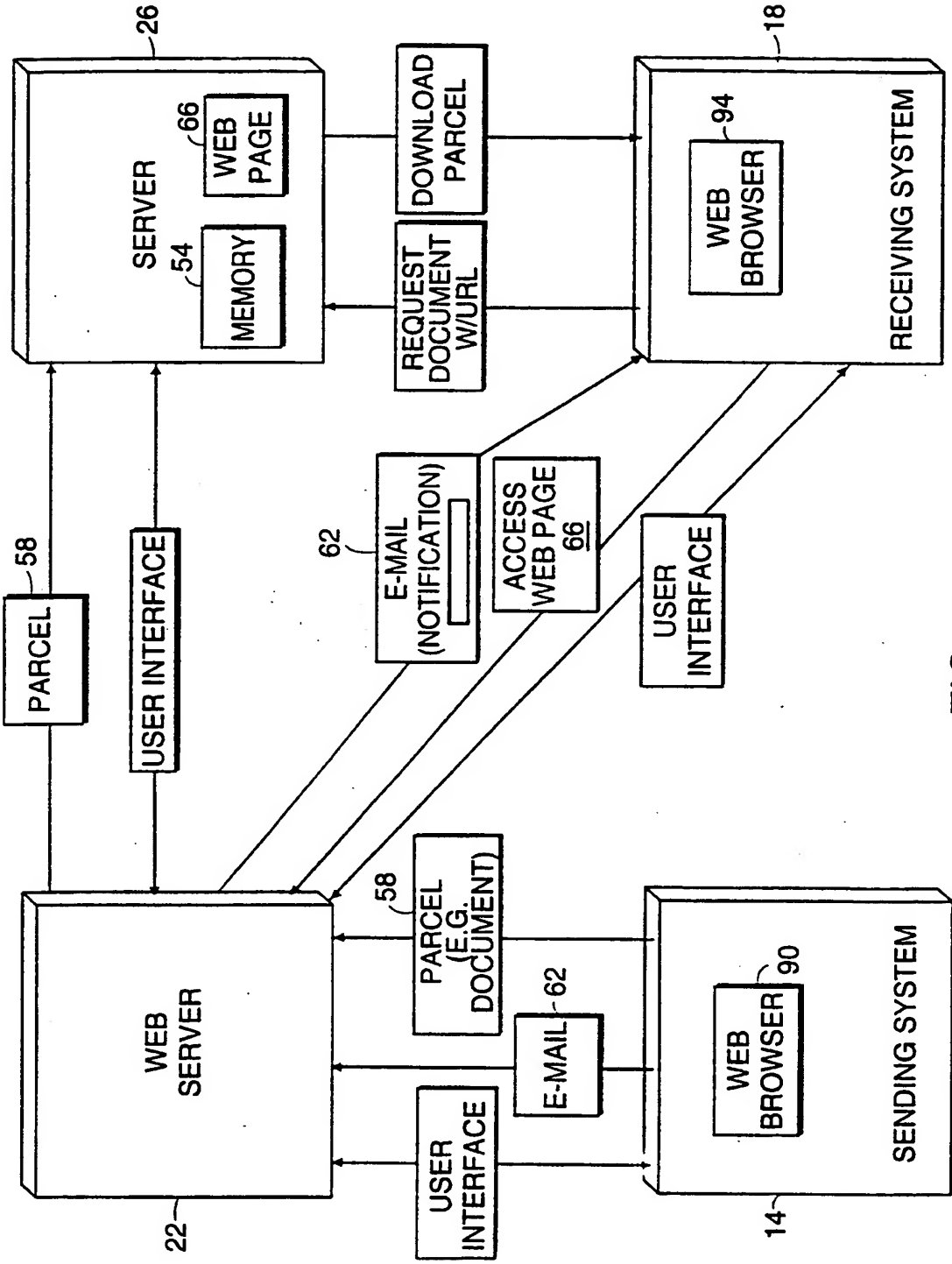
26
SERVER
66
WEB PAGE
54
MEMORY
DOWNLOAD PARCEL
REQUEST DOCUMENT W/URL
18
94
WEB BROWSER
RECEIVING SYSTEM
58
PARCEL
USER INTERFACE
62
E-MAIL (NOTIFICATION)
ACCESS WEB PAGE 66
USER INTERFACE
WEB SERVER
22
58
PARCEL (E.G. DOCUMENT)
62
E-MAIL
USER INTERFACE
90
WEB BROWSER
SENDING SYSTEM
14

FIG. 5

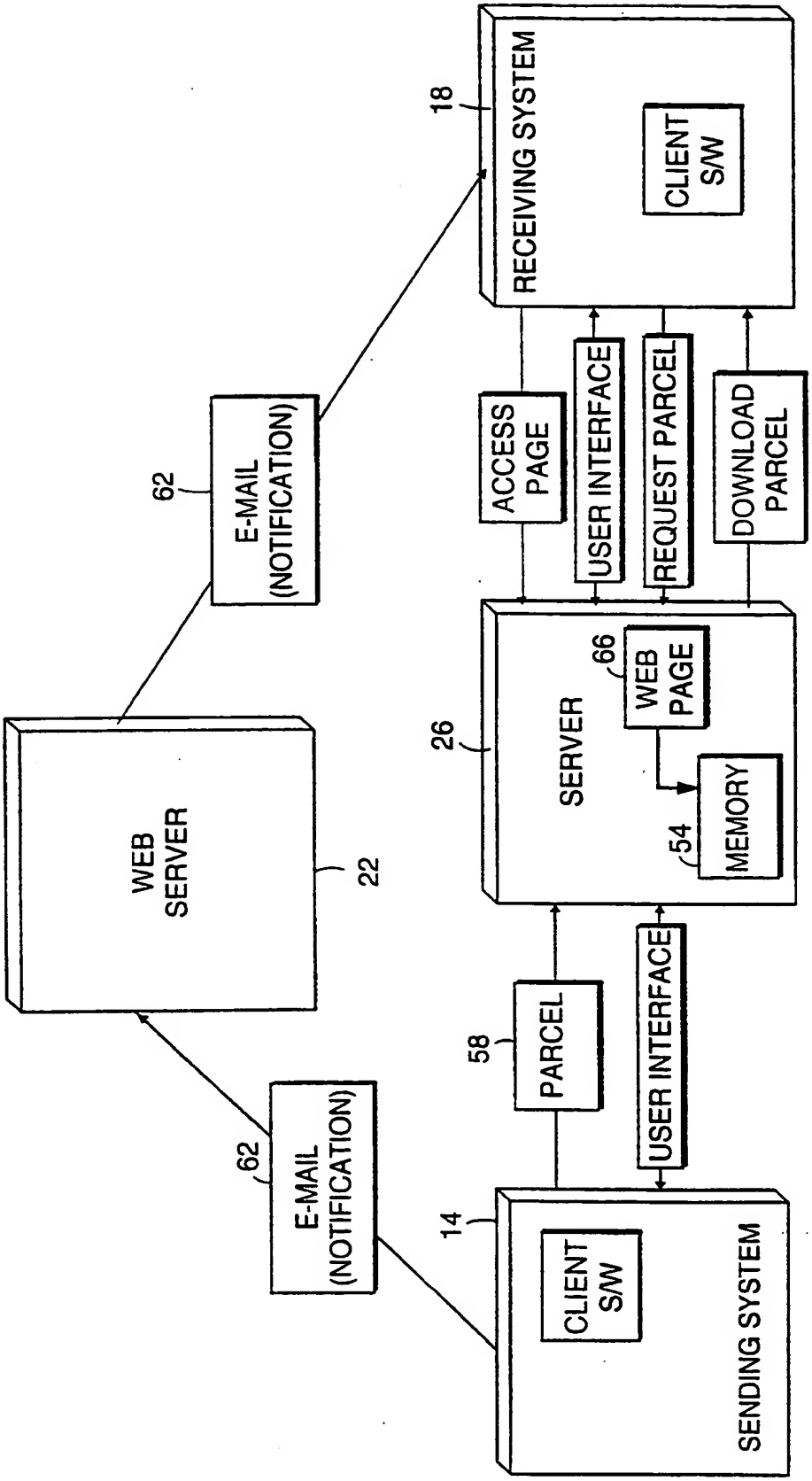
RECEIVING SYSTEM
18
CLIENT S/W
ACCESS PAGE
USER INTERFACE
REQUEST PARCEL
DOWNLOAD PARCEL
62
E-MAIL (NOTIFICATION)
WEB SERVER
22
SERVER
26
66
WEB PAGE
MEMORY
54
58
PARCEL
USER INTERFACE
62
E-MAIL (NOTIFICATION)
14
CLIENT S/W
SENDING SYSTEM

FIG. 6

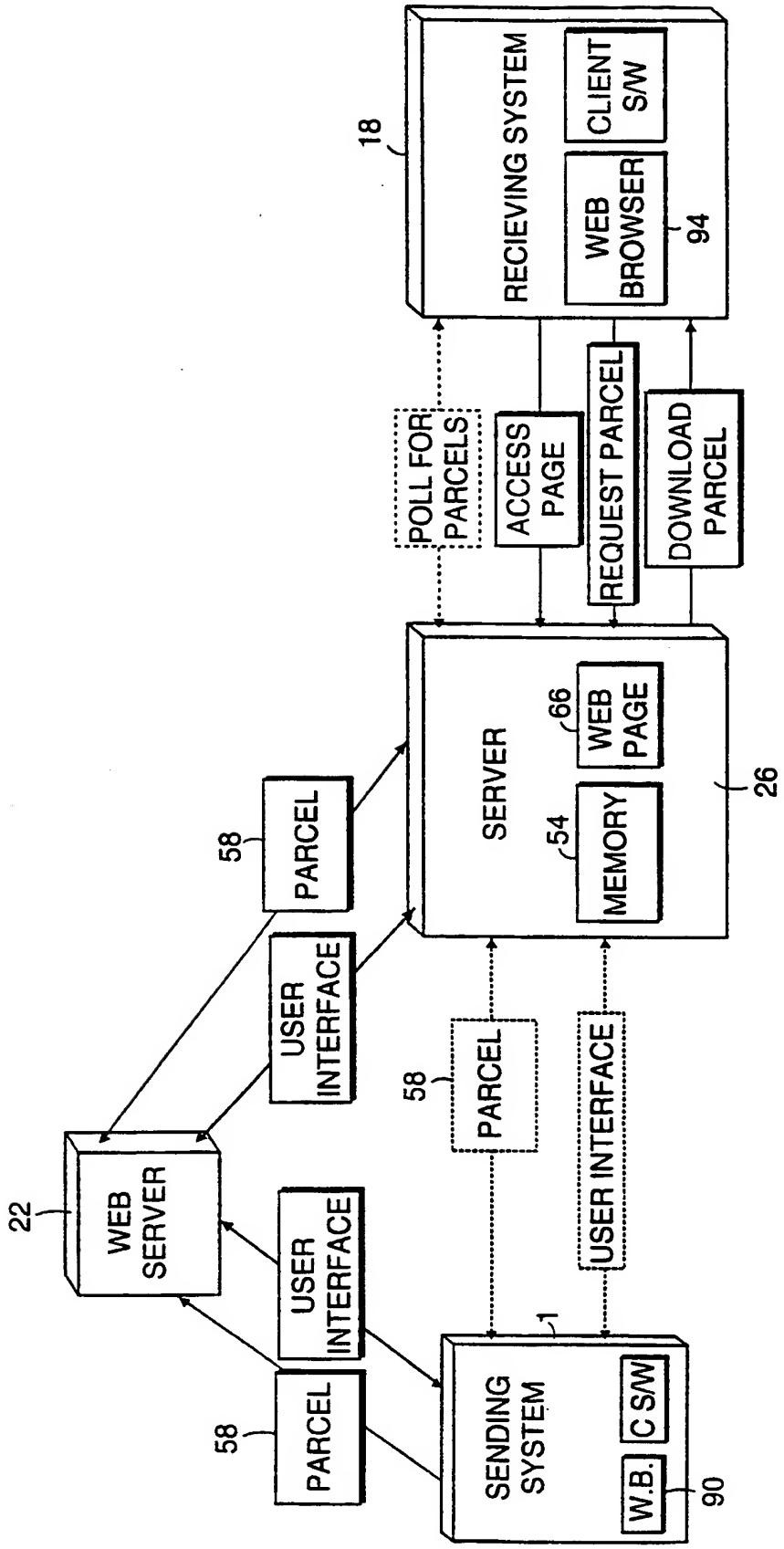
18
RECIEVING SYSTEM
CLIENT S/W
WEB BROWSER
94
POLL FOR PARCELS
ACCESS PAGE
REQUEST PARCEL
DOWNLOAD PARCEL
SERVER
66
WEB PAGE
54
MEMORY
26
58
PARCEL
USER INTERFACE
22
WEB SERVER
USER INTERFACE
58
PARCEL
USER INTERFACE
1
58
PARCEL
SENDING SYSTEM
C S/W
W.B.
90

FIG. 7

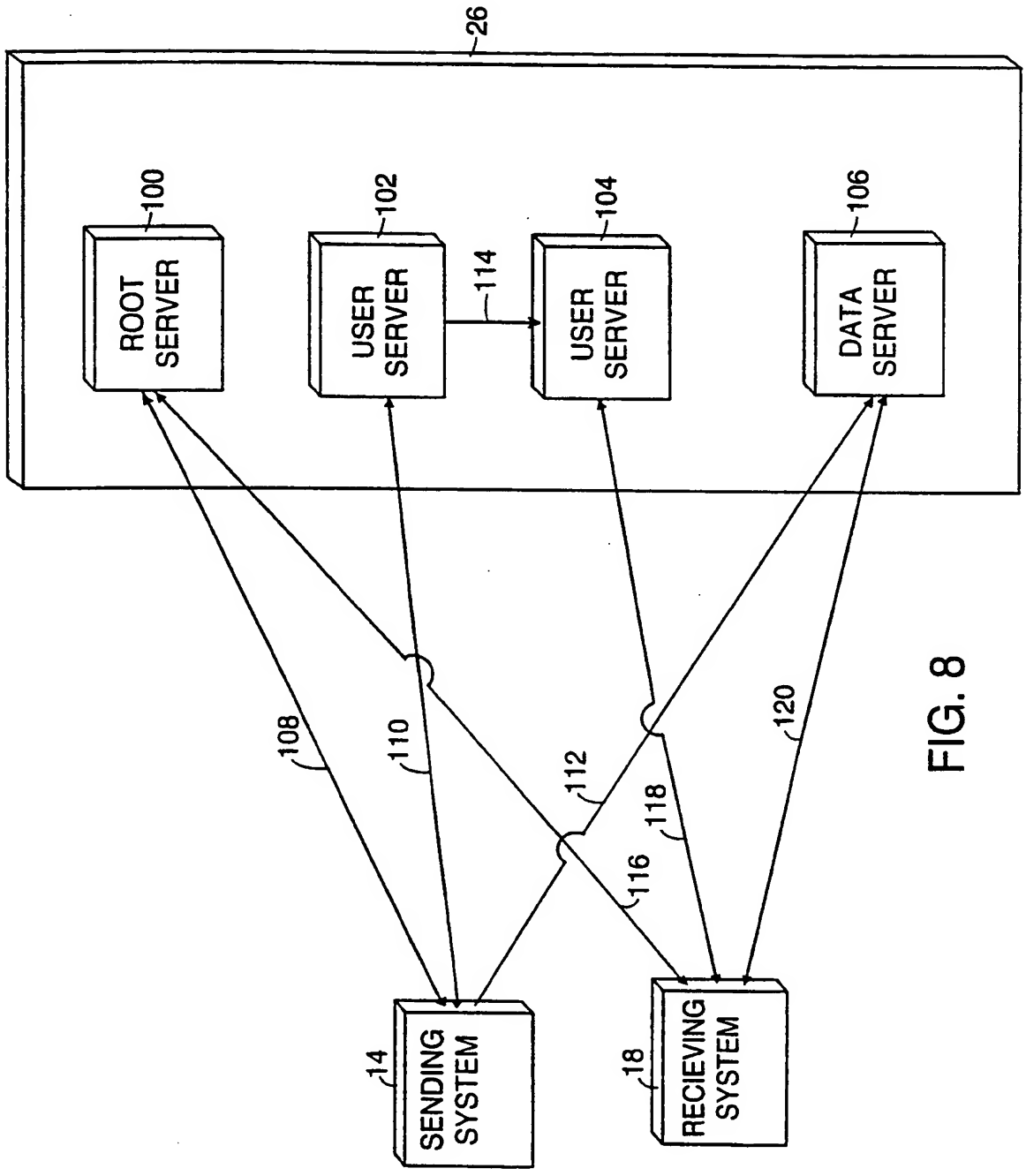
26
100
ROOT SERVER
102
USER SERVER
114
104
USER SERVER
106
DATA SERVER
108
110
112
116
118
120
14
SENDING SYSTEM
18
RECIEVING SYSTEM

FIG. 8